



Effects of *Atriplex lentiformis* on the soil characteristics in Shahre Rey area(Iran)

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Abstract

One of the plants that is used for the rehabilitation and development of arid and semi-arid rangelands in recent years is *Atriplex*. Given that this plant is an imported species in the most area, it can affect the components of ecosystems, particularly the soil. In this study, the effect of *Atriplex lentiformis* on the soil characteristics are studied and compared in Share Rey area - in three areas of control, near the plants and between the plants. Results showed that there is a significant difference between the amount of nitrogen, phosphorus, potassium, organic matter, salinity and acidity of the soil in three areas of control, near the plants and between the plants and the amount of nitrogen, phosphorus, potassium, organic matter, salinity and soil acidity have increased 58.37%, 6.24%, 61.3%, 40.9%, 12.6% and 78.66%, respectively, in near the plant compared to the control area.

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Introduction

Planting the different species of *Atriplex*, has begun about 35 years ago in Iran Moghimi (2005). The good growth of this plant in arid and semi-arid conditions and their resistance to the drought and soil salinity Dehghani *et al.*, (2012) as well as palatability of their produced forage in desert pastures for livestock grazing Aouissat *et al.*, (2011) has caused that over the years thousands of hectares of saline land and destroyed pasture are allocated to this species. However, it should be noted that the entrance of a new species into the area can have different effect on the component of an ecosystem, especially its soil. Yuma *et al.* (2006) refers to the planting of *Atriplex lentiformis* in reducing the evaporation from the soil and its impact on water resources management. Hente (2005) states that the planting of *Atriplex canescens* has increased some soil components such as nitrogen, acidity and salinity. Mohammadi *et al.*, (2010) refer to the increase in the soil acidity and soil salinity in the area in which *Atriplex* is planted. In studying the effect of planting *Atriplex lentiformis* on the soil characteristics, Chalak Haghighi (2000) concluded that the cultivation of this plant increases the nitrogen, potassium, phosphorus and organic matter in the soil under plants. Given the existence of poor or destroyed pastures in Shahre Rey - Iran and *Atriplex* planting in this area for using livestock this study examines the effect of *Atriplex lentiformis* on the soil of the area.

Materials and methods

The area studied

The area studied is located in 20 km in south of Shahre Ray. Latitude of this area is 34°, 35' north and its longitude is 51°, 26' east. The least area temperature is reported -18 ° C and the maximum absolute temperature is reported 44 ° C. It is 1095 meters above sea level and the average rainfall is 200 mm. in this area rainfall has no good distribution so

that there is rainfall 32 days during the year that is in winter and spring mostly.

Research Method

To evaluate the effects of planting *Atriplex lentiformis* on soil characteristics, first the adjacency of areas the plant cultivated, the area where this plant has not cultivated was selected (the control area). This area is similar to the adjacent area planted in any sense and are different only in the presence or absence of species of *Atriplex lentiformis*. In order to investigate the characteristics of soil planted and control, 10 samples were taken systematically - randomly from 0 to 30 cm of soil depth in the way that the first point was randomly selected as the first sample and the next samples were selected with the intervals of 100 m from each other. Also in the area planted in two places in under the plant and between the plants sampling was conducted. For each sample from the three areas of control, under the plant and between the plants, the amount of nitrogen, potassium, phosphorus, organic matter, acidity (pH) and soil salinity (Ec) were measured. Given the uniform conditions of the area, the data were analyzed based on a random complete experimental design and by SAS software.

Results and discussion

According to Table 1. the difference between all soil components measured in three treatment of the control, under the plant and between the plants is significant. And the amounts of nitrogen, potassium, phosphorus, organic matter, acidity and salinity in under the plant were more than two other area (control and between the plants).

Table 1. Analysis of variation of soil factors.

SOV	df	Mean Square					
		N	P	K	OM	EC	PH
treatment	2	0.0014	1.130127	30516.27	0.36	5.91	1.25
error	12	7.27E-06	0.122743	10.53333	0.00186	0.01151	0.00155
CV	-	4.4	3.67	1.14	4.4	2.78	0.46

The comparing the amounts of components measured between two area of control and under the plant shows that nitrogen, phosphorus, potassium, organic matter, soil acidity and salinity of the soil increased 58.37%, 6.24%, 61.3%, 40.9%, 12.6% and 78.66% ,respectively (Table 2). The comparison between the

control and between the plants also shows that the amounts of components measured in the area between the plants are more than control area, so nitrogen, phosphorus, potassium, organic matter, soil acidity and salinity are increased 26.5%, 4.13%, 7.67%, 17.3%, 5.41% and 39.33% ,respectively (Table 2).

Table 2. Mean of soil factors in studied area.

Factors	PH	EC	OM	K	P	N
Under plant	8.94	4.942	0.992	372.6	10.04	0.0776
Between the plants	8.37	3.854	0.826	244.6	9.84	0.062
Control	7.94	2.766	0.704	231	9.45	0.049

The comparing two area of under the plant and between the plant also shows that the amounts of all soil components except phosphorus had a significant increase in near the plant, although the amount of its increase is lower than the control area that confirms the results of Mohammadi *et al.* (2010), Hente (2005) and Chalak Haghighi (2000). Studying the effects of *Atriplex* planting on soil characteristics shows that due to loss of aerial components the amount of components and salts of shallow soil in near the plant increases. Also, given the high concentration of salts in leaves of plants that are in the results of their absorption by plant roots, after the loss and degradation of their aerial components the amount of salts under the soil of plants significantly increases (Hente, 2005) This study well indicates that although planting *Atriplex* in arid and semi-arid areas increases vegetation and fodder production for livestock but it can have the different effects on soil of the area that leads to soil salinity generally and it should be considered in the management of development and modification of vegetation ecosystems.

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